REMARKS

I. CLAIM STATUS

Claims 20, 22, and 24-38 are currently pending. Claim 20 has been amended to recite the limitations of claims 21 and 23. Accordingly, claims 21 and 23 are cancelled and the dependency of claims 22, 24, and 25 have been amended herein without prejudice or disclaimer. No new matter has been added.

II. REJECTIONS UNDER 35 U.S.C. § 103(a)

A. Claims 20-29, 33, and 36-37

The Office continues to reject claims 20-29, 33, and 36-37 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,225,749 to Pierre et al. ("Pierre") in view of WO 99/33070 to Belli et al. ("Belli") and in further view of WO 02/27731 to Castellani et al. ("Castellani").[1] *See* Nov. 17, 2009, Office Action at 2-6 and 10-11. In replying to Applicants' response filed September 9, 2009, the Office disagrees with Applicants that the references do not teach a continuous process, contending that "in fact Pierre teaches a continuous process of manufacturing cable, although the entire process from the beginning to the end is not continuous. . . ." *Id.* at 10. The Office further states that "[Belli] also teaches a continues [sic] process for coating insulating material on a cable core via extruding (page 15, last 2 lines, page 16 lines 14-16], and it is obvious to combine two continues process to have one continues [sic] process [sic] to have one continues [sic] process." *Id.* The Office contends that "Pierre teaches a

[1] The Office relies on U.S. Patent No. 6,824,870 as a translation of WO/02/27731. All references herein to Castellani refer to the U.S. patent.

continuous process for forming a metallic shield and Castellani teaches the metallic shield is a metallic screen." *Id.* Finally, the Office states that "it is inherent that the hot coating has to cool down before applying the metal coating and [Belli] also teaches cooling down process after extruding process as [Belli] teaches [page 16 line 22]." *Id.* at 10-11. Applicants respectfully disagree with and traverse this rejection for at least the reasons for record, as well as the following additional reasons.

Several basic factual inquires must be made in order to determine the obviousness or non-obviousness of claims of a patent application under 35 U.S.C. § 103. These factual inquiries, set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 U.S.P.Q. 459, 467 (1966), require the Examiner to:

(1) Determine the scope and content of the prior art;

(2) Ascertain the differences between the prior art and the claims in issue;

(3) Resolve the level of ordinary skill in the pertinent art; and

(4) Evaluate evidence of secondary considerations.

The obviousness or nonobviousness of the claimed invention is then evaluated in view of the results of these inquiries. *Graham*, 383 U.S. at 17-18, 148 U.S.P.Q. at 467; *see also KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1730, 82 U.S.P.Q.2d 1385, 1388 (2007).

In determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention *as a whole* would have been obvious. M.P.E.P. § 2141.02(I). To that end, discovering the source or cause of a problem is part of the "as a whole" inquiry. M.P.E.P. § 2141.02(III). In the instant case, Applicants

respectfully submit that the Office has erred in ascertaining the difference between the cited art and the claimed invention because the Office does not appreciate Applicants' discovery of the source or cause of a problem and the solution thereto.

1. The Combination of Pierre, Belli, and Castellani Does Not Teach or Suggest a Continuous Process, As Claimed

Pierre, Belli, and Castellani do not teach a person of ordinary skill in the art how to operate a process in a continuous manner from feeding a conductor to forming a circumferentially closed metallic screen by longitudinally folding a metal sheet with any reasonable expectation of success. This is highlighted by the Office's argument:

> Pierre teaches a continuous process of manufacturing cable, **although the entire process from the beginning to the end is not continuous**, fig. 2 clearly teaches the process is **continuous at least in part** which is the processing of the cable after coated with insulating layer and during the coating with metal screen. However, Billie [sic] also teaches a **continuous process for coating insulating material** on a cable via extruding. . . .

Nov. 17, 2009, Office Action at 10 (emphasis added).[2] As Applicants have previously noted, Pierre, Belli and the other art cited by the Office consistently teach the need for a resting or collecting step after forming the insulating layer. *See* WO 99/33070 at p. 16, lines 22-26, page 17, lines 21-23, and page 18, lines 7-14 (teaching that a semi-finished product must be stored on a reel before adding a metal screen); *see also*, WO 02/47092 at page 23, lines 1-6 (storing on a reel before adding metal screen 6); '027 Patent at col. 14-15 (winding cable on bobbin prior to adding a conventional sheath).

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[2] To the extent the Office intended to suggest by "also" that Pierre teaches a continuous process for the addition of metal strip 14 to cable 12, that argument is incorrect. Pierre is silent regarding how cable 12 is formed.

It is the fact that Pierre and Belli require a resting or collecting step following the coating of the insulating layer that makes the prior art processes, by definition, not continuous. *See* Felder & Rouseau, "Elementary Principles of Chemical Processes," 81-82 (1978) (contrasting batch, semi-batch, and continuous processes) (copy attached).

Further, neither Pierre nor Belli teach or suggest how to make the process continuous from feeding a conductor to forming a circumferentially closed metallic screen by longitudinally folding a metal sheet with any reasonable expectation of success. As discussed in detail below, it cannot be done without cooling the cable, for example to a temperature from about 30°C to about 70°C.

Moreover, Castellani does not correct these deficiencies. Contrary, to the Office's description (Office Action at 4 & 5), Castellani does not teach or suggest the appropriateness of a cooling step prior to adding an additional layer, such as a metal screen. Rather, a full reading of column 11, lines 4-14, of Castellani show that column 11, lines 9-11 merely disclose that the FINISHED cable of the example was cooled to 100°C in oil and then ambient, *i.e.*, room temperature (20-25°C), in a water bath. *See e.g.*, http://en.wikipedia.org/wiki/Room_temperature#Ambient_versus_room_temperature; *see also*, Specification-as-filed at 6. This teaching would not motivate a person of ordinary skill in the art to modify the teachings of Pierre and Belli and to eliminate their resting/collecting step and obtain a continuous process, as claimed. At best, the Castellani teaching may suggest a means to modify how the cable was processed prior to resting/collecting.

Under these circumstances, it is inappropriate for the Office to "conclude" that a continuous process is obvious. Given the art cited by the Office, a person of ordinary skill in the art could reasonably conclude:

> (1) the combined cited art consistently teaches that a resting/collecting step is necessary after the extrusion step; and
>
> (2) there is no known way in the cited art, even combined as suggested, to operate successfully the process in a continuous manner.

As detailed in the specification, Applicants discovered at least one source for the problem that heretofore forced the prior art to apply a resting or collecting step following the coating of the insulating layer. Specifically, Applicants determined that voids form between the metallic screen and the insulating layer of the finished cable when adding a metal screen in a continuous operation, as suggested by the Office. Specification as-filed at 4, lines 19-20. The formation of voids is believed to be due to the differences in expansion properties of metals and plastics; when the cable cools from a high temperature (such as >70 °C), the insulating layer shrinks faster than the metal screen, particularly when the metal screen has been formed into a tube by a longitudinal folding of the metal sheet. Id. at 4, lines 22-32.

The presence of voids inside a cable is particularly problematic because they may cause the formation of partial electrical discharges during the operation of the cable and thus the breakdown thereof. *Id.* at 4, line 31, to 5, line 1. In addition, voids can also cause mechanical problems because kinks may occur due to the buckling of the metallic screen under remarkable or successive bending actions occurring on the cable (e.g., during the winding of the finished cable on a collecting reel or on a storage

unit). *Id.* at 5, lines 2-7. Further, because a polymeric layer is generally extruded over the metallic screen, the formation of kinks, such as by voids, in the metallic screen may cause localized detachments of the polymeric layer from the screen. *Id.* at 5, lines 11-13. It was Applicants who discovered that cooling the cable, for example, to a temperature less than about 70°C, allowed the process to operate continuously from feeding a conductor to forming a circumferentially closed metallic screen by longitudinally folding a metal sheet. *Id.* at 6. Applicants also discovered that rather than cooling to room temperature (20-25°C) as seen in the prior art's resting/collecting step of their discontinuous processes, a continuous process could operate at a higher temperature of about 30°C. *Id.*

Nothing in the record suggests the formation of voids was known to one of skill in the art. Nothing in the record suggests that art was aware of how to operate a continuous process and obtain an acceptable product. Nothing in the record suggests that the art was aware that cooling the cable, for example to a temperature from about 30°C to about 70°C, permitted a continuous process. Nothing in the combination of Belli, Pierre, and Castellani teaches or suggests that the claimed continuous process was feasible, let alone that there might be a reasonable expectation of success.

Because a "patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious once the source of the problem is identified" (M.P.E.P. § 2141.02(III) (citation omitted)), Applicants respectfully submit that the discovery of the problem of voids in the instant case is part of the required "as a whole" inquiry of obviousness. By not considering this, the Office has erred in

ascertaining the differences between the cited art and the claimed invention and incorrectly concluded that the combination was obvious.

Since a person of ordinary skill in the art, based on the teachings of Pierre, Belli, and Castellani, would not know how to extrude a thermoplastic insulating layer and form a circumferentially closed metallic screen by longitudinally folding a metal sheet around said extruded insulating layer in a continuous manner, as claimed, with a reasonable expectation of success, Applicants respectfully submit that the Office has failed to establish a *prima facie* case of obviousness and thus, request withdrawal of the rejection.

2. The Combination of Pierre, Belli, and Castellani Does Not Teach or Suggest a Continuous Process, Comprising "Cooling the Extruded Insulating Layer to a Temperature From About 30°C to About 70°C," As Claimed

Instant claim 20 recites, in relevant part, "[a] continuous process for manufacturing an electric cable, comprising the steps of . . . cooling the extruded insulating layer to a temperature from about 30°C to about 70°C . . . ." In finding this claim element obvious, the Office cites M.P.E.P. § 2144.05(II)(***A***), seeking evidence of criticality. Nov. 17, 2009, Office Action at 4-5 (discussing claims 21-22). However, the Office does not consider the ***prerequisite*** M.P.E.P. § 2144.05(II)(***B***), which ***requires*** that the particular parameter must first be recognized as a result-effective variable, *i.e.*, "a variable which achieves a recognized result." In other words, the Office must identify evidence that the ***art*** recognizes that adjusting the temperature of an extruded insulating layer up or down achieves some desired result in the cable. Applicants respectfully submit that there is no evidence of record to suggest that the temperature of

an extruded insulating layer is a result-effective variable, nor has the Office even attempted to meet this burden.

Moreover, in response to the Office's allegation that evidence of criticality is required (Nov. 17, 2009, Office Action at 5), Applicants respectfully submit that such evidence is already of record. For example, Applicants found the maximum temperature of the extruded insulating layer at the time of forming the circumferentially closed metallic screen thereupon to be a critical parameter, as discussed in the specification. Specification at 4, lines 14-18. Applicants perceived that, in case the maximum temperature of the insulating layer is higher than a predetermined threshold value, the temperature of the metallic screen remarkably increases and, when the finished cable is wound on a collecting reel, kinks can be formed in the metallic screen due to its buckling. *Id.* at 5, lines 18-22.

Thus, Applicants respectfully submit that the Office has failed to show temperature is a result-effective variable and Applicants have provided evidence of the criticality of temperature.

Accordingly, for at least these reasons, Applicants respectfully submit that the Office has failed to establish a *prima facie* case of obviousness and thus, request withdrawal of the rejection.

B. Claims 30, 33, and 34

The Office continues to reject claims 30, 33, and 34 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Pierre, Belli, Castellani, and U.S. Patent No. 6,501,027 to Belli et al. ("the '027 patent"). *See* Nov. 17, 2009, Office Action at 6-7

and 10-11. Applicants respectfully disagree with and traverse this rejection for at least the reasons for record, as well as the following additional reasons.

As discussed above, Pierre, Belli and Castellani fail to disclose each and every element of independent claim 20, whether considered alone or in combination. Further, the '027 patent does not cure these deficiencies, as tacitly admitted by the Office's reliance on the disclosure of the '027 patent for other purposes. Accordingly, Applicants respectfully submit that claims 30, 33, and 34 are patentable over the combination of Pierre, Belli, Castellani and the '027 patent and thus, request withdrawal of the rejection.

C. Claims 31 and 32

The Office continues to reject claims 31 and 32 under 35 U.S.C. § 103(a) as being unpatentable over the combination of Pierre, Belli, Castellani, and WO 03/088274 to Belli et al. ("WO '274"). *See* Nov. 17, 2009, Office Action at 7-8 and 10-11. Applicants respectfully disagree with and traverse this rejection for at least the reasons of record, as well as the following additional reasons.

As discussed above, Pierre, Belli and Castellani fail to disclose each and every element of independent claim 20, whether considered alone or in combination. In addition, WO '274 does not cure these deficiencies, as tacitly admitted by the Office's reliance on the disclosure of WO '274 patent for other purposes. Accordingly, Applicants respectfully submit that claims 31 and 32 are patentable over the combination of Pierre, Belli, Castellani and WO '274 and thus request withdrawal of the rejection.

D. Claim 35

The Office continues to reject claim 35 under 35 U.S.C. § 103(a) as being unpatentable over Pierre, Belli, Castellani and U.S. Patent No. 6,416,813 to Prats ("Prats"). *See* Nov. 17, 2009, Office Action at 8-9 and 10-11. Applicants respectfully disagree with and traverse this rejection for at least the reasons of record, as well as the following additional reasons.

As discussed above, Pierre, Belli and Castellani fail to disclose each and every element of independent claim 20, whether considered alone or in combination. In addition, Prats does not cure these deficiencies, as tacitly admitted by the Office's reliance on the disclosure of Prats for other purposes. Accordingly, Applicants respectfully submit that claim 35 is patentable over the combination of Pierre, Belli, Castellani and Prats and thus request withdrawal of the rejection.

E. Claim 38

The Office continues to reject claim 38 under 35 U.S.C. § 103(a) as being unpatentable over a combination of Pierre, Belli, Castellani, and WO 2002/047092 to Belli et al. ("WO '092"). *See* Nov. 17, 2009, Office Action at 9 and 10-11. Applicants respectfully disagree with and traverse this rejection for at least the reasons of record, as well as the following additional reasons.

As discussed above, Pierre, Belli and Castellani fail to disclose each and every element of independent claim 20, whether considered alone or in combination. In addition, WO '092 does not cure these deficiencies, as tacitly admitted by the Office's reliance on the disclosure of WO '092 for other purposes. Accordingly, Applicants

respectfully submit that claim 38 is patentable over the combination of Pierre, Belli, Castellani and WO '092, and thus request withdrawal of the rejection.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to Deposit Account No. 06-0916.

Respectfully submitted,

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Dated: April 15, 2010

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Attachment: Felder & Rouseau, "Elementary Principles of Chemical Processes," 81-82 (1978)

ELEMENTARY PRINCIPLES OF CHEMICAL PROCESSES

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Chapter Five
FUNDAMENTALS OF MATERIAL BALANCES

There are certain restrictions imposed by nature that must be taken into account when designing a new process or analyzing an existing one. You cannot, for example, specify an input to a reactor of 1000 grams of lead and an output of 2000 grams of lead or gold or anything else; similarly, if you know that 1500 pounds of sulfur are contained in the coal burned each day in a power plant boiler, you do not have to analyze the ash and stack gases to know that 1500 pounds of sulfur per day leave the furnace in one form or another.

The basis for both of these observations is the law of conservation of mass, which states that mass can neither be created nor destroyed. (We will not be concerned in this book with nuclear reactions, for which this law does not hold.) Statements based on the law of conservation of mass such as "total mass of input = total mass of output," or "$(\text{lb}_m \text{ sulfur/day})_{\text{in}} = (\text{lb}_m \text{ sulfur/day})_{\text{out}}$" are examples of *mass balances* or *material balances*. The design of a new process or analysis of an existing one is not complete until it is established that the inputs and outputs of the entire process and of each individual unit satisfy balance equations applied to each process material.

Part 2 of this book, which begins with this chapter, outlines procedures for writing material balances on individual process units and multiple-unit processes. In this chapter we present methods for organizing known information about process variables, setting up material balance equations, and solving these equations for unknown variables. In Chapters Six and Seven we introduce various physical properties and laws that govern the behavior of process materials, and indicate how these properties and laws are taken into account (as they must be) in formulating material balances.

5.1. PROCESS CLASSIFICATION

Chemical processes may be classified as *batch*, *continuous* or *semibatch*, and as either *steady state* or *transient*. Before writing a material balance on a process system, you must know which of these categories the process falls into.

(a) *Batch process.* The feed is charged into the system at the beginning of the process, and the products are removed all at once some time later. No mass crosses the system boundaries between the time the feed is charged and the time the product is removed.
Example. Rapidly add reactants to a tank, and remove the products and unconsumed reactants some time later when the system has come to equilibrium.

(b) *Continuous process.* The inputs and outputs flow continuously throughout the duration of the process.
Example. Pump a mixture of liquids into a distillation column at a constant rate, and steadily withdraw vapor and liquid streams from the top and bottom of the column.

(c) *Semibatch process.* The inputs are nearly instantaneous and the outputs are continuous, or vice versa.
Examples. Allow the contents of a pressurized gas container to escape to the atmosphere; slowly blend several liquids in a tank from which nothing is being withdrawn.

If the values of all the variables in a process (i.e., all temperatures, pressures, volumes, flow rates, etc.) do not change with time, except possibly for minor fluctuations about constant mean values, the process is said to be operating at *steady state*. If any of the process variables changes with time, *transient* or *unsteady-state* operation is said to exist. By their nature, batch and semibatch processes are unsteady-state operations (why?), whereas continuous processes may be either steady state or transient.

Batch processing is commonly used when relatively small quantities of a product are to be produced on any single occasion, while continuous processing is better suited to large production rates. Continuous processes are usually run as close to steady state as possible; unsteady-state (transient) conditions exist during the start-up of a process and following changes—intentional or otherwise—in process operating conditions.

TEST YOURSELF

Classify the following processes as batch, continuous, or semibatch, and transient or steady state.

1. A balloon is filled with air at a steady rate of 2 grams per minute.
2. A bottle of milk is taken from the refrigerator and left on the kitchen table.
3. Water in an open flask boils.
4. Carbon monoxide and steam are fed into a tubular reactor at a steady rate, and react to form carbon dioxide and hydrogen. Products and unused reactants are withdrawn at the other end. The reactor contains air when the process is